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Health information exchange and information gaps in referrals to a pediatric emergency department

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ABSTRACT

Objective: to assess the extent of information gaps between three information sources available at admission to a pediatric Emergency Department (ED): Health Information Exchange (HIE) system, physicians' referral letters and information collected from patients/parents at admission to the ED (patient's medical history).
Materials and methods: A retrospective cohort study of 170 medical records of children aged 6 months to 18 years referred to a pediatric ED for a common childhood disease. Each record was reviewed for information on lab and imaging tests, vaccinations, allergies, previous diagnoses, recent and chronic medical treatment in the HIE system and referral letter, or from the patient's medical history taken on admission to the ED. The percent overlap between information sources and information gaps was assessed.
Results: The most informative source, in terms of addressing all key areas, was the patient's medical history, with an average of 73.5% indication of each information key area. Next was the HIE system, with 54.1% indication of each key area; the least informative was the referral letter (43.9%). The overall overlap in data availability among all information sources occurred on average in 23% of the cases. HIE's ability to provide data missing from other routinely available sources was mainly in the area of chronic medication dosages (37% of cases).
Conclusions: Each of the three major information sources available at admission to a pediatric ED lack important data and each makes its own unique contribution. Improving documentation in electronic health records, on which HIE systems feed from can narrow significant information gaps at the most critical time-point—admission to a pediatric ED.

1. Introduction

Health information exchange (HIE), the movement of information among healthcare systems and providers, is being promoted as a promising strategy ensuring meaningful use of health information, better care coordination, and improved patient care [1,2]. HIE ensures instant availability of all relevant information for healthcare decision making, enabling cross-disciplinary communication and guaranteeing continuity of care, as well as automatic medication reconciliation and examination of adherence to treatment recommendations [3], thereby potentially, reducing duplication, inconsistencies and omissions [4].

Over the past 20 years various HIE systems have been developed, but many have failed for various reasons [5]. Technical issues, costs, competitive concerns, data privacy and security concerns, and workflow implementation challenges have been described as hindering HIE participation [6–10]. Following new provisions of the US Health Information Technology for Economic and Clinical Health (HITECH) Act, HIE systems are being widely implemented [2]. Yet recent studies indicate that only 30% of hospitals participate in HIE in the US [11,12], that low percentages of data are exchanged between hospitals [12] and that HIE use remains low [13–16].

The advent of HIE and the realization of its considerable healthcare improvement potential has stimulated a wide array of studies, focusing on implications for cost savings [17,18], healthcare utilization [19], public health tracking to prevent cross-over infections [20], characterization of successful HIE efforts [6], assessments of providers' perception of HIE [7,21] and recently evaluations of HIE use in practice [13,14,22]. Studies on information exchange usage in

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emergency departments and clinics in the US show that the HIE systems are accessed infrequently and that use is affected by patient and clinical characteristics [13,14,22].

A major reason to implement HIE is its ability to provide additional or more accurate timely information than that available from other sources [23]. However, HIE systems rarely stand alone, and even in healthcare systems that fully implement HIE use, other forms of information transfer, such as referral letters or collection of medical history from patients, are routinely used. Thus, an important area of investigation in HIE use is its ability to provide complete, accurate patient information and to complement or verify information from other sources.

A setting in which the ability to quickly collate and integrate information from various sources is critical is the Emergency Department (ED). This is an information-intensive environment in which care is unscheduled, is at high acuity levels and prone to distractions due to noise and crowding, and in which rapid decision making is pivotal [24,25]. Moreover, as some patients might be unable to recall or provide pertinent information due to new or preexisting conditions, communication barriers and/or their health literacy skills [26,27], timely transfer of information through referral letters and availability of HIE systems is key. Referral letters to pediatric EDs serve as an important source of information available to the ED staff [28]. In Israel, most patients are admitted to the ED with a referral letter from their primary care physician, as hospital care follows a "hospitalist" model [29]. Referral letters typically include a short description of the patients' history, medication list and lab test results as well as the current reason for referral [30]. However, as referral letters often lack important information [28,31,32], HIE and its ability to increase access to extra-institutional clinical information may change the standards of care in the ED [33]. Although HIE is valuable in an ED setting [34], research to date has not examined its potential value in terms of its ability to complement existing information sources for timely ED care.

In Israel, "Clalit Health Services" (Clalit), the largest healthcare organization, insurer and provider for over four million persons, deployed in 2004 an interoperable solution covering electronic health record (EHR) integrated system and HIE network (known as OFEK, literally **"horizon"**). OFEK aggregates the EHR information on all Clalit enrollees from all healthcare contacts (hospitals, community primary care and specialty clinics, pharmacies, imaging and labs), into a single, virtual, patient file, enabling providers to obtain complete, real-time information needed for healthcare decision-making at the point of care [35]. Several studies have examined the OFEK system usage patterns [36] and its impact on service utility, admission decisions, overcrowding and reducing avoidable admissions in ED [35,37–40].

Despite increasing uptake of the OFEK system (with recent expansion to additional healthcare organizations), in Israel there are currently no auditing mechanisms or incentives to promote actual use of the system for retrieval of information at the point of care [36]. As implementation of HIE systems throughout healthcare organizations is resource intensive [41], studies that assess aspects that may affect use and relevancy for medical decision making are needed. More specifically, while timely use of information is especially pertinent in the pediatric ED, research that tests the extent HIE systems like the OFEK can be used in pediatric ED to improve information continuity is needed. The main objective of this study is to assess the types of information available from three major sources in pediatric ED admissions: community physicians' referral letter, patient's medical history taken at admission to the ED, and the HIE system. We characterize the types of information available in each information source, and then compare them in order to identify the extent of information gaps, overlap among the various information sources, and the unique (exclusive) contribution of each source.

2. Methods

Data were collected and analyzed from 1 to 29 February 2012. All research was conducted with institutional review board approval and under complete confidentiality (using de-identified data).

2.1. Study settings and HIE technology overview

In Israel, every citizen is required by law to be a member of one of four health plans [42]. Clalit, the largest, is a not-for-profit insurer and provider for over 4 million persons (54% of Israel's population), which developed and fully operates OFEK, an integrated HIE system, in all its clinics and hospitals [36]. Clalit members receive hospitalization services from Clalit- and non-Clalit-operated hospitals throughout Israel. At the time of the study Clalit also exclusively operated OFEK in several government-owned and operated non-Clalit hospitals. One of these served as the setting for this study.

2.2. Study population

The study population was drawn from an Israeli tertiary hospitals' billing database. We began with a pilot of 50 records, to test the medical record abstraction form which was used to categorize the types of information in each information source as detailed below (referral letter, patient's medical history and OFEK). During the pilot phase the data abstraction instrument's reliability was tested on 15 medical records by two raters (one of the authors and a pediatric ED nurse) for an inter-rater reliability check, reaching high inter-rater reliability (Kappa = 0.87–0.91).

Subsequently, the first author performed medical record abstraction. We reviewed 902 medical records of children admitted to the ED during the study period. Inclusion criteria were age 6 months to 18 yrs, enrollees of Clalit, referred with a referral letter from a primary care or specialist physician, and referral for common childhood diseases (Fig. 1). We excluded a total of 732 medical records for the following reasons: age younger than 6 months or older than 18 yrs; enrollees belonged to other health plans than Clalit; absence of referral letter; referral was not by a primary care or specialist provider (e.g., by an after-hours medical service); referral was for traumatic injury; or due to exacerbation of a chronic condition: rare/metabolic/psychomotor diseases. The final study population consisted of 170 medical records of children admitted to the pediatric ED.

2.3. Data abstraction instrument

2.3.1. Description of domains

We reviewed the literature for studies on important information that should be available in referrals to EDs published from 1995 to August 2014. The following terms were searched in PubMed, Cochrane Library, ScienceDirect and ProQuest databases: transitional care/continuity of care, referral letters; and emergency departments; and Health Information Exchange/ Integrated Health Information Technology; and pediatrics. The search resulted in identification of key information domains for treatment in the ED: lab and imaging tests, vaccinations status, allergies, previous diagnoses, recent medical treatment for the current illness episode, and chronic medical treatment. These domains are considered important for inclusion in referrals as they are central to emergency medical decision making [43]. The data abstraction instrument was created based on classification of information in these domains.